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COOPERATIVE MARKETING
AND PROCESSING OF PEACHES
IN THE SOUTHEAST

By

NEPHTUNE FOGELBERG

COOPERATIVE RESEARCH AND SERVICE DIVISION

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By

Nephtune Fogelberg
Senior Agricultural Economist

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The 1941 peach crop in the Southeastern States was the largest on record--60 percent greater than the 1940 crop. In spite of increased consumer demand, the greatly augmented production depressed prices received by growers until they averaged approximately 30 percent lower than those for the previous year. Such prices were not sufficient to warrant many growers picking their fruit.

At such times the Southeastern peach growers turn toward processing and canning to bolster fresh fruit prices and also salvage something from the poorer grades of fruit that cannot be marketed as fresh. The 1941 season was no exception to this tendency. Commercial canners, who

NOTE.—Henry W. Bradford, Junior Agricultural Economist, Farm Credit Administration, assisted in compilation of some of the statistical data.

had not canned peaches in years, again considered the advisability of including peaches in their lists of canned goods. Growers and agricultural leaders discussed the possibilities for organizing cooperative canning and processing associations. Many questions were raised, which finally led to a request for this study.

It should be noted that there is a moderate upward trend in United States peach production which is apt to continue, judging from the relationship between bearing and nonbearing trees. The general trend of peach production in Georgia, North Carolina, South Carolina, Tennessee, Alabama, and Florida combined was downward until 1941 when a record crop was produced. With the exception of North Carolina and South Carolina, which have a great many peach trees that have not reached the bearing stage, the relationship between bearing and nonbearing trees indicates little change in the moderate upward trend. Peach production in South Carolina, however, will be increased 100 percent within the next 4 or 5 years, according to estimates.

Most of the United States peach production is marketed as fresh fruit. For the 5-year period 1935-39, 67 percent of the total production was sold as fresh fruit, 23 percent canned, and 10 percent dried. During the 5-year period, 1937-41, California canned an average of 94 percent of the total United States pack of peaches. While the bulk of the canned peaches are clingstone varieties, freestone varieties are also canned--two-thirds of which are packed in California.

A good, uniform quality pack is necessary for success. One of the difficulties with the southeastern canned peach industry is lack of such a pack. Prior to the issuance of regulations for canned peaches by the Food and Drug Administration, the majority of peaches canned were culls. Since then, lack of quality has been mainly caused by varying degrees of maturity, no uniform sizes, and the presence of blemishes. This situation naturally has resulted in lowering prices for southeastern canned peaches to meet the competition of California canned peaches.

Freestone peaches must be harvested at the proper stage of maturity to provide a quality canned product. Since this is a later stage than for picking fruit for the fresh market, growers are reluctant to wait and do not train their picking crews for this type of harvesting. Also the optimum period for harvesting fruit for canning purposes is short. Consequently the production of a quality canned product is dependent upon educating the growers as to these necessities and obtaining their full cooperation.

The most serious canning plant problem appears to be the question of extending the canning season as long as possible in order to have fixed charges per unit at a minimum, thereby enabling a cooperative cannery to meet the competition of other canners. This can be accomplished by beginning canning operations with the early varieties and continuing through the late varieties, or by supplementing peach canning with canning of other products. A sufficient number of peach

varieties are available to permit canning operations over a 2 months period, although the present production of these specific varieties is not large enough to permit capacity operations for a given cannery during such a period.

Thus a program of production planning for sufficient quantities of each variety to provide balanced operations is necessary for a proposed cannery. Supplementary canning crops are usually available, but the distance involved in getting many of them to a proposed plant appears greater than the average distances for canneries located in the United States as a whole. The technical problems of peach canning, however, are certainly not insurmountable if a skilled plant foreman is obtained.

Research has proved that a good quality Southeastern canned peach can be produced. The peach varieties that are particularly well suited to canning, such as the Ambergem, Sunbeam, and Vedette, generally are not produced in commercial quantities in this area. On the other hand, the Halehaven is an excellent canning peach and is produced in commercial quantities in the Southeastern States. Other peach varieties that are produced in quantity, such as the Elberta, are rated from fair to good as a canning peach. This situation stresses again the necessity for a comprehensive program which includes raising of certain varieties of peaches to be canned if the most satisfactory results are to be expected.

The general interest in canning peaches varies considerably from year to year. If the different peach varieties do not mature in the normal sequence then the need for canning becomes greater. A heavy yield also increases the demand for processing. When a heavy yield is combined with different varieties maturing at the same time, as in 1941, the need for canning becomes very great. As a contrast the interest in canning subsided considerably during 1942 in spite of the large crop because the crop matured in a more normal fashion, the Federal marketing agreement in Georgia kept inferior peaches off the market, and prices for the fresh fruit were relatively high. In fact some canners experienced difficulty in obtaining sufficient quantities of peaches for canning. The successful operation of a peach cannery is a business in itself and not an "in" and "out" proposition. It takes time to build up a trade and once acquired such a trade must be served regardless of the conditions in the fresh fruit market.

Other types of processing, such as treating peaches with sulphur dioxide, freezing, and dehydration are so closely related to canning that it is not feasible to undertake such operations as separate enterprises. If they are undertaken, they should be only an adjunct to canning.

The opportunities for processing and marketing peaches on a cooperative basis in the Southeastern States depend as much upon the general attitude of growers toward cooperation as they do on the economic factors involved. The growers must determine to form and operate

a cooperative cannery on a sound basis, recognizing that success is dependent upon their support of the organization year in and year out, irrespective of conditions which may prevail in the industry generally. Cooperation among farmers in the Southeastern States has not developed to the same extent as in many other sections of the country. A smaller percentage of the farmers use cooperative associations in this area and the rate of discontinuance of cooperative activity is the highest for any area in the United States. The history of agricultural cooperation in this area has made growers skeptical, and, therefore, the successful launching of a cooperative cannery requires more than the ordinary caution and foresight and the building of confidence.

Only seven cooperative associations are marketing and processing peaches in the Southeast, of which four are in Georgia and three in South Carolina. Of these associations, three market peaches in the fresh state only, two sell fresh fruit and do some canning, and two are set up for the primary purpose of canning.

These canneries and other cooperative organizations were visited and groups interested in forming cooperative associations were contacted. Federal, State, and commercial agencies furnished statistical and laboratory data. Representatives of the trade were interviewed. In short, every effort was made to bring together the available pertinent data.

DOMESTIC SUPPLY

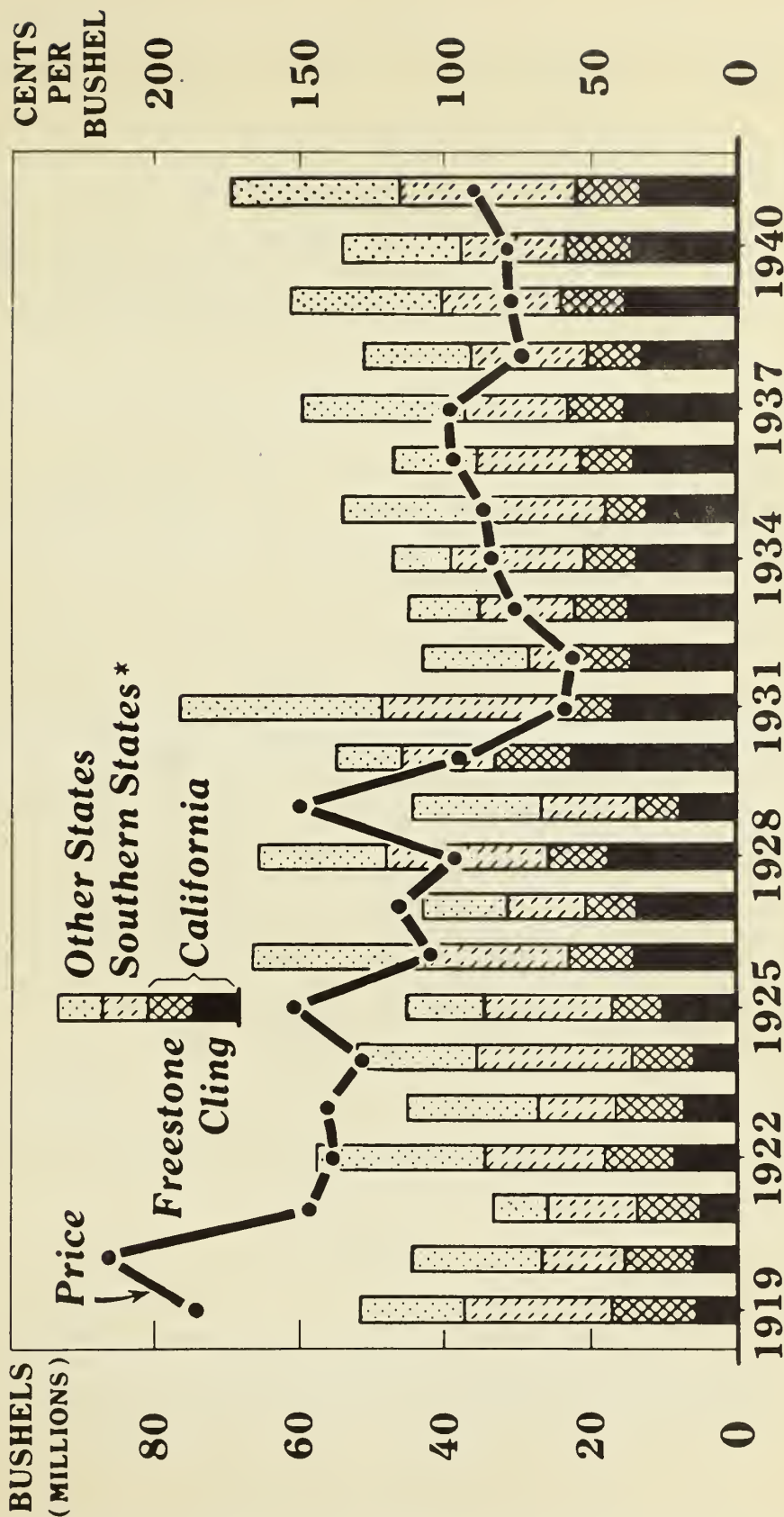
In determining the opportunities for developing the processing and marketing of peaches on a cooperative basis in the Southeastern States, it is necessary to consider the total domestic supply of peaches since returns to growers in these States are directly affected by the production and utilization of peaches in other areas. A picture of the domestic supply situation can be obtained by reviewing the United States production of peaches, the status of bearing and nonbearing trees, the foreign trade in peaches, and the utilization of the domestic supply.

Production and Prices to Growers

The production of peaches in the United States has increased from an average of 47,303,000 bushels for the 5-year period, 1911 to 1915 inclusive, to an average of 54,930,000 bushels for the 5-year period, 1936 to 1940 inclusive. The increase in average production is equal to approximately 25 percent of the first 5-year period. This upward trend has been irregular as indicated by chart 1 (also table 11, appendix), in that a year of heavy production is generally followed by a year of lighter production. The upward trend from 1921 to 1931 was accompanied by a downward trend in prices received by producers. Since 1932 there has been a moderate upward trend in both production and prices. Peaches are grown in 40 of the 48 States. The eight States for which no peach production is reported are Maine, Minnesota, Montana, North Dakota, South Dakota, Vermont, Wisconsin, and Wyoming. More than one-half of

CHART 1

Peaches: Production and Price Received by Farmers, United States, 1919-41

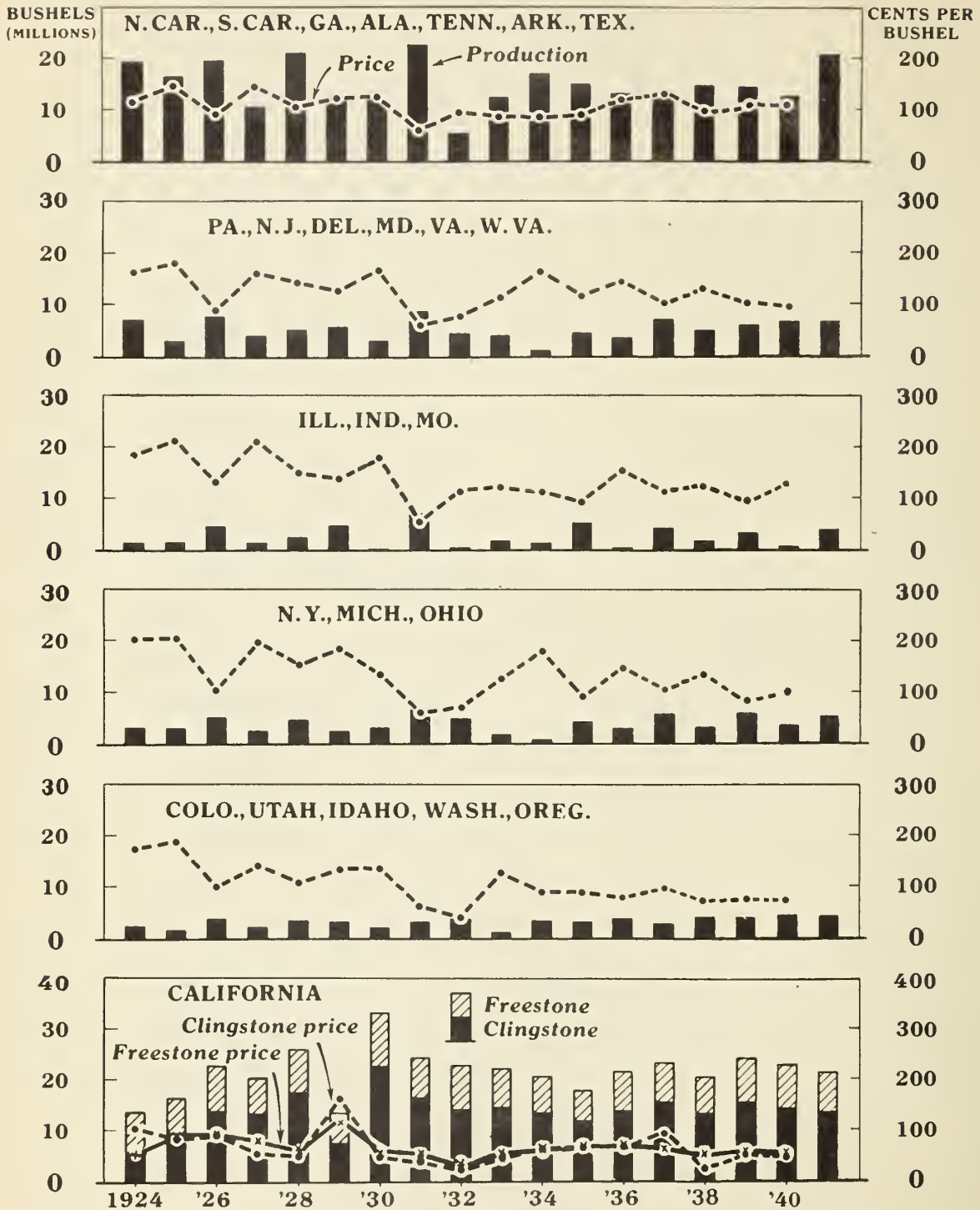


* INCLUDES NORTH CAROLINA, SOUTH CAROLINA, GEORGIA, FLORIDA, TENNESSEE, ALABAMA, MISSISSIPPI, ARKANSAS, LOUISIANA, OKLAHOMA, AND TEXAS

DATA FOR 1941 ARE PRELIMINARY

CHART 2

Peaches: Production and Prices Received by Farmers in Leading Regions, 1924-41



1941 PRODUCTION INDICATED JUNE 1

the 1930-39 average United States production of peaches came from California with 42.3 percent and Georgia with 9.3 percent.

Chart No. 2 shows the production of peaches and prices received by farmers in leading regions from 1924 to 1941. The fluctuations in the peach crop shown on this chart are caused by growing conditions from year to year and variations in the different areas. The chart also shows how, in general, the prices received by the farmers in the leading regions vary inversely to production.

While Georgia is the principal source of peaches in the Southeastern States, the production in terms of 5-year averages shows a downward trend (table 1). Georgia peach production has declined from an average of 6,909,000 bushels for the 5-year period, 1926-30, to 4,331,000 bushels for the 5-year period, 1936-40. North Carolina and South Carolina, on the other hand, have shown an upward trend in production in terms of 5-year averages from 1921 to 1935 (table 1). With the exception of the period 1936 to 1940, the 5-year average peach production in Tennessee and Alabama has shown little change. Florida is relatively unimportant as a source of peaches.

Table 1. Peach Production in Six Southeastern States, 1921 - 1941

State	Average production				1941
	1921-25	1926-30	1931-35	1936-40	
	1,000 bu.				
Georgia	6,439	6,909	5,449	4,331	5,561
North Carolina	1,182	1,848	2,319	1,685	2,760
South Carolina	700	984	1,531	1,510	3,471
Tennessee	1,329	1,323	1,391	1,012	2,186
Alabama	1,072	945	915	1,364	2,464
Florida	124	89	59	54	43
Total	10,876	12,098	11,664	9,956	16,485

Source: U. S. Dept. of Agriculture, Bureau of Agricultural Economics.

Bearing and Nonbearing Trees

Peach trees 3 and 4 years old are generally classified as nonbearing even though light yields are obtained. Trees about 5 and 6 years old are classified as bearing even though full bearing or maximum production is not generally obtained until about the 7th year. The commercial life of peach trees varies with the horticultural practices followed, the local environment, and the part of the country in which the trees are located. As a rule, commercial peach trees in California last from 20 to 25 years with the State average being nearer 25. In the Southeastern States, on the other hand, commercial peach trees last from 12 to 15 years with the average being nearer 12. The average life of commercial peach trees in the Northeast is approximately 15 years. By weighing these various sections of the country according to the production, the average life of commercial peach trees in the United States would be approximately 18 years.

According to the 1940 census, there were 68,867,222 peach trees in the United States, of which 47,147,060 were classified as bearing and 21,720,162 nonbearing. Based on an average life of 18 years and considering all trees under 5 years old as nonbearing, approximately 8.4 million of the 21.7 million nonbearing trees represent a potential increase in peach production. Assuming no change in average yield, the potential increase in production will equal approximately 14 percent by the time these nonbearing trees come into production. The 14 percent represents only a rough approximation since changes in yield and the actual ages of the trees cannot be considered. The important conclusion is that the moderate upward trend in total United States peach production will probably continue.

The relationship between bearing and nonbearing peach trees in the Southeastern States is shown in table 2.

Table 2. Bearing and nonbearing peach trees in six Southeastern States, 1930, 1935, and 1940

State	1940			1935			1930		
	Bearing	Non-bearing	Per- cent- age Bear- ing	Bearing	Non-bearing	Per- cent- age Bear- ing	Bearing	Non-bearing	Per- cent- age Bear- ing
	Trees	Trees	%	Trees	Trees	%	Trees	Trees	%
Ga.	6,671,212	1,916,469	77	3,530,576	992,924	87	7,914,134	1,306,130	86
N. C.	2,361,334	1,249,051	65	2,428,063	695,425	77	2,674,922	394,733	81
S. C.	2,220,539	1,387,769	62	1,176,708	391,812	75	1,161,006	274,134	81
Tenn.	1,781,880	652,233	73	2,223,245	472,037	82	2,747,078	918,892	75
Ala.	1,512,666	725,041	68	156,211	46,747	77	132,089	72,095	85
Fla.	126,663	65,500	36	84,701	32,993	72	139,841	68,269	37
Total	14,874,319	5,939,063	71	12,002,504	2,632,538	82	14,769,070	3,274,313	82

Source: U. S. Dept. of Commerce, Bureau of Census.

Assuming that the average life of a peach tree in a commercial orchard in any of the 6 Southeastern States is 12 years, the relationship between bearing and nonbearing trees in 1930 indicated a potential increase in production of 6.8 percent, in 1935 of 6.4 percent, and in 1940 of 24 percent, providing the average yield per tree remains constant. The relative importance of the individual States in 1940 as a source of potentially greater peach production is as follows: South Carolina 43 percent; North Carolina 35 percent; Florida 34 percent; Alabama 30 percent; Tennessee 20 percent; and Georgia 13 percent. Considering only the 3 principal States for the last 3 census years, South Carolina has shown the greatest tendency to increase peach production, North Carolina next, and Georgia the least.

The census data can be supplemented to a certain extent by data compiled by the Extension Service in some of the States. For the past 6 years the Extension Service at The Clemson Agricultural College, Clemson, S. C., has been making annual surveys of the peach trees, both new and old, in South Carolina. This survey covers plantings of commercial orchards only — 5 acres or larger — and represents a coverage of at least 95 percent of all the trees in commercial orchards of the State. As of October 1, 1940, according to this survey, there were 1,395 commercial growers in the State with a total of 3,828,534 peach trees of which 1,563,426 trees or 41 percent were of bearing age and 2,265,108 trees or 59 percent of nonbearing age. During the winter of 1940-41 an additional 600,000 trees were planted, but there was no increase in plantings during the winter of 1941-42. This survey indicates a greater potential increase in peach production in South Carolina than that of the census data. The Extension Horticulturist at Clemson, S. C., estimates the 1941 peach production as equivalent to 7,000 carloads and estimates a potential production equivalent to 15,000 cars within about 5 years.

The Extension Service at Athens, Ga., undertook a similar tree survey for that State this past spring. Preliminary data representing approximately 60 percent of the total commercial peach orchards show that of the total number of trees surveyed 28 percent were 10 years of age or more; 57 percent were bearing but less than 10 years of age; and 15 percent were nonbearing.

Foreign Trade

Foreign trade in peaches is of minor importance considering the total United States production. The average annual exports of peaches as canned, dried, and fresh for the 5-season period, 1935-36 to 1939-40, were equal to 4.8 percent of the average United States peach production for this period. Of the total exports, 82 percent represented canned peaches, 11 percent fresh peaches, and 7 percent dried peaches (table 13, appendix). Hostilities in Europe materially reduced the exports of canned and dried peaches. Exports of canned peaches for the 1940-41 season were only 5 percent of the average for the preceding 5-season period. A comparable figure for dried peaches is 24 percent (table 13, appendix).

For the 5-season period, 1935-36 to 1939-40, approximately 95 percent of the total exports of fresh peaches went to Canada, and approximately 89 percent of the exported canned peaches went to the United Kingdom. Of the total exports of dried peaches during this same period, 28 percent went to France, 23 percent to Canada, 14 percent to the United Kingdom, and 9 percent to Sweden.

Some fresh peaches are imported into the United States during the winter months from Chile. The quantity of such imports is relatively small - averaging less than 20,000 bushels per year.

Utilization of Domestic Peach Production

Peaches are consumed in fresh, canned, and dried form. Table 3 shows in terms of 5-year averages, the relative importance of these different ways of marketing peaches.

Table 3. Utilization of Domestic Production of Peaches, United States, 1920 to 1940

Utilization	Average Production ¹				
	1920-24	1925-29	1930-34	1935-39	1940
	1,000 bu.				
Fresh	33,068	37,136	39,171	36,362	35,484
Canned	7,665	11,400	8,873	12,404	13,000
Dried	5,798	4,818	5,685	5,617	5,946
Total	46,531	53,354	53,729	54,383	54,430

Utilization	Percentage of total production used in specified manner				
	1920-24	1925-29	1930-34	1935-39	1940
	Percent				
Fresh	71	70	73	67	65
Canned	17	21	16	23	24
Dried	12	9	11	10	11
Total	100	100	100	100	100

¹Production of dried and canned peaches in terms of fresh fruit.

Source: *Agricultural Statistics, 1941, U. S. Dept. of Agriculture and Monthly Summary of Foreign Commerce of the United States, U. S. Dept. of Commerce.*

Most of the peach production is marketed as fresh fruit. In terms of 5-year averages from 1920 to 1940, the percentage of the total peach production that was sold fresh ranged from 67 to 73 percent, the percentage going into cans from 16 to 23 percent, and the percentage dried from 9 to 12 percent. When individual years are considered during the period 1920 to 1940, the ranges in these percentage figures are: Fresh fruit 62 to 83 percent, canned fruit 10 to 25 percent, and dried fruit 7 to 15 percent.

The peach producing States, other than California, produce primarily for the fresh market, and consequently produce freestone varieties

of peaches. From June to early August, 10 Southern States¹ are the principal source of market supplies of fresh peaches, after which supplies from other areas dominate the markets. Peach growers in California, on the other hand, have developed peaches for processing. Being far removed from the fresh fruit markets of the country and discovering the merits of the clingstone peach for canning, processing was encouraged and a suitable list of clingstone peach varieties was developed. The freestone varieties of peaches produced in California are used for drying and for sale in the fresh form.

CANNED PEACHES

The feasibility of developing the processing and marketing of peaches on a cooperative basis depends in a general way on the trends in the domestic supply of peaches and the portion of that supply going into cans. It depends to a greater extent, however, on some of the detailed considerations involved in peach canning, such as, the size of pack, the canning properties of different peach varieties, the likelihood of proper harvesting, the ability of proposed plants to handle large volume in a short time, the necessity for lengthening the canning season by packing products other than peaches, the all important problem of marketing, and the costs of marketing.

Pack

More peaches were canned in 1941 than in any previous year with the exception of 1928.² After the large pack of nearly 14 million cases in 1937, the total pack dropped to 10.4 million cases in 1938 and then climbed to nearly 15 million cases in 1941 (table 4). During this 5-year period California canned an average of 94 percent of the total United States pack of peaches. The relative importance of California canned peaches declined, however, from 98 percent for 1938 to 88 percent for 1941.

Three other States - Washington, Oregon, and Michigan - were the sources next in line for canned peaches. For the period shown in table 4, these States canned 3.6 percent of the total pack, with Washington canning 1.8 percent, Oregon 0.9 percent, and Michigan 0.9 percent. All three States increased their relative importance as a

¹North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

²The 1928 peach pack was 14,975,436 actual cases according to Canned Food Pack statistics, 1941, part 2, Fruits, Division of Statistics, National Cannery Association, Washington, D. C., June 1942.

source of canned peaches during the period. The percentage of total pack canned in these three States in 1937 and 1941 were:

State	1937	1941
	Percent	Percent
Washington	0.54	2.97
Michigan	0.53	1.93
Oregon	0.58	1.36

The year 1941 also witnessed a substantial increase in peach canning in States that heretofore have canned very little. During the 5-year period, 1936 to 1940, the States other than New York, Michigan, Utah, Washington, Oregon, and California accounted for only 0.5 percent of the total United States pack of canned peaches. In 1941, however, the pack of these other States represented 5.6 percent of the total 1941 pack.

The recent stimulation of peach canning outside of California means an increase in the canning of freestone peaches. Practically all the canned clingstone peaches came from California. During the 5-year period, 1936 to 1940, an average of 90 percent of the canned peaches consisted of clingstone and 10 percent of freestone varieties. Comparing individual years the percentage of freestone peaches has increased from 6.7 percent in 1936 to 16.2 percent in 1940 (table 14, appendix).

Table 4. United States Canned Peach Pack by States, 1937 to 1941¹

State	Canned Peach Pack				
	1937	1938	1939	1940	1941
	<i>Actual Cases</i>				
New York	35,123	11,242	41,520	31,086	61,920
Michigan	73,460	12,944	135,449	48,660	285,321
Utah	764	10,958	17,871	30,197	34,912
Washington	75,265	113,212	218,217	299,577	439,092
Oregon	79,950	60,934	109,555	107,623	200,314
California	13,595,108	10,044,968	11,561,555	10,908,444	12,931,841
Other States	19,874	146,100	32,000	37,714	825,015
Total	13,879,554	10,400,358	12,116,173	11,463,883	14,778,415

Source: Canned Food Pack Statistics, 1941, Part 2 - Fruits, Division of Statistics, National Canners Association, Washington, D. C., June, 1942.

¹Spiced peaches not included.

²In addition to the 1941 commercial pack, 301,297 cases were processed on Government contract.

It is not to be inferred that California cans only the clingstone varieties. On the contrary, approximately two-thirds of the total free-stone peaches canned are packed in California. This means that free-stone peaches canned in the Southeastern States must compete with both clingstone and freestone peaches canned in California. This is significant because California peach growers look on canning as the major outlet for their peaches rather than as a means of removing a surplus from the fresh market.

Peach Canneries in the Southeast

Peaches are commercially canned in Florida, Georgia, South Carolina, and Tennessee, but not in Alabama and North Carolina. The number of canneries operating in the four States are as follows: Georgia 14; South Carolina 6; Florida 3; and Tennessee 3. (table 5).

Table 5. Principal Products Canned by Commercial Packers canning peaches in the Southeastern States

Product	Commercial Canneries Operating In			
	Florida	Georgia	So. Carolina	Tennessee
	<i>Number</i>			
Asparagus	1	2	3	-
Beans, green or wax	3	8	2	2
Blackberries	-	1	-	2
Okra	1	2	3	1
Okra & Tomatoes	1	3	3	2
Peaches	3	14	6	3
Peas, Blackeye & Crowder	-	5	-	1
Pimentos	2	8	1	-
Spinach	-	2	1	1
Sweet Potatoes	1	4	1	2
Tomatoes	3	6	2	3
Tomato Products	1	-	-	2
Turnip Greens	2	9	1	1
Other Vegetables	1	2	2	2
Other Fruit	2	-	3	-
Fish	-	2	-	-
Other Products	-	1	-	1

Source: *Canners' Directory, National Canners Association, Washington, D. C., 1942.*

Peaches are only one of several products canned by these commercial packers with three exceptions - all cooperative associations which can only peaches. The noncooperative canners pack, in addition to peaches, an average of six other products. The range in the number of other products canned by the noncooperatives is from 1 to 22 with 83 percent of the packers canning less than 10 other products and with 43 percent canning less than five other products.

The products, other than peaches canned, vary somewhat with the location of the canner. For example, the packers in Florida can citrus fruit in various forms. The principal products other than peaches, however, are very similar for each of the four States and consist of the following, arranged in order of importance.³ Green and wax beans - 15 packers; tomatoes and tomato products including okra - 15 packers; turnip greens - 13; pimentos - 11; sweet potatoes - 8; peas - 6; asparagus - 6; spinach - 4; and blackberries - 3.

Canning Qualities of Different Varieties

The interest in the canning qualities of different peach varieties has been stimulated by two factors. Growers in areas other than the Pacific Coast States produce peaches principally for the fresh market and generally prefer this to growing fruit for commercial canners. But when prices for fresh fruit are poor and it is difficult to dispose of the lower grades of fruit, growers look toward canning as the answer to their marketing problem. Whether or not these surplus peaches are the varieties best suited to canning must then be considered.

Commercial peach canning is a business in itself and some canners have felt the need for a raw product that can compete on a satisfactory price basis with the canned product from the Pacific Coast States. These canners have encouraged State experiment stations to test good canning varieties to see whether they could be grown successfully in the local area concerned. For example, at the request of fruit canners in Michigan, the South Haven Experiment Station in 1923 brought a collection of cling-stone varieties, including the most important varieties grown in California, to Michigan for trial. The varieties proved to be unsatisfactory, largely because of poor growth or unproductiveness.

As a result of such interest several public agencies have undertaken laboratory research to determine the suitability for canning of the more important commercial eastern varieties of peaches and of the conditions necessary to produce therefrom a canned product of acceptable appearance, flavor, and dessert quality. The Office of Horticulture, Bureau of Plant Industry, United States Department of Agriculture undertook such a study in 1924 and published the results in 1930.⁴

Culpepper and Caldwell found that in all the varieties studied the development of full characteristic flavor is delayed until the fruit has become fully ripe and rather soft. When fruit is removed from the tree at any stage of maturity prior to the full soft-ripe stage, the

³That is, important as far as being canned by the largest number of packers who also can peaches is concerned. No figures are available as to the quantities of different products canned by these packers.

⁴Culpepper, C. W., and Caldwell, J. S. *The Canning Quality of Certain Commercially Important Eastern Peaches*. U. S. Dept. of Agr., Tech. Bul. 196, 47 pp. 1930.

fruit never attains the full rich flavor characteristic of the variety ripened on the tree. The highlights of this study can be gleaned from the following quotation taken from the summary:

"In order to produce a canned product having an attractive appearance with good flavor and dessert quality, the fruit used must have developed as much as possible of the characteristic tree-ripe flavor, but must be firm enough to withstand preparation and processing without breaking down. The varieties here dealt with soften so rapidly in ripening that any individual fruit remains in ideal condition for canning for only 24 to 72 hours. If the peach is canned prior to reaching this condition, the canned product will be hard, deficient in flavor, and more or less unpalatable; if it is canned after passing the ideal condition it will be unattractive in appearance as a result of disintegration in processing. The determination of the upper and lower limits of the ideal canning condition and of means of readily recognizing it have been given special attention in this study."

"The greatest difficulty encountered in canning operations is in connection with the lye-peeling process. In order to be lye peeled, fruit must be firm or disintegration of the tissue occurs, with resulting impairment of the appearance of the pack. In most of the varieties here tested great care must be exercised to pick the fruit at a stage of maturity in which color and flavor are sufficiently developed to be satisfactory and in which the fruit is sufficiently firm to be lye peeled.

"The varieties here studied cannot be stored at ordinary temperatures for any considerable periods without softening to such an extent as to make impossible the packing of a product of satisfactory appearance. Consequently, fruit should be canned on the same day it is picked, unless cold storage is available. Fruit picked at proper canning stage and held in storage at 32 degrees F for 15 to 30 days retains its firmness and can be made into a pack of good appearance, but is somewhat deficient in flavor as compared with fruit canned directly from the tree.

"Of the varieties employed in these tests, the J. H. Hale is decidedly superior to the others as material for canning in size, shape, color and texture of flesh, rate of softening during ripening, and retention of form during processing. Elberta ranks second, being somewhat less satisfactory in most of these respects. Both varieties are somewhat deficient in flavor. Yellow Hiley made a product of distinctive flavor, but is rather too irregular in shape and soft in texture. Arp combines small size, poor flavor, and soft texture in flesh and has no possibilities as a canning peach. Early Rose made a product of good dessert quality and very attractive appearance, but is too small. Hiley was somewhat deficient in flavor and is small in size and soft in texture. Carman was least satisfactory of all the varieties tested, by

reason of its habit of ripening unevenly on the two sides and the excessive softening, which results in disintegration during canning. Belle was generally superior to the other white-fleshed varieties in flavor, but its tendency to soften in processing, although not greater than in some others, makes necessary the exercise of considerable care in packing it."

During the summer of 1933 the Bureau of Plant Industry, United States Department of Agriculture, undertook a study to determine the suitability for canning purposes of 45 varieties of peaches grown under Eastern climatic conditions. The fruit was obtained from the Arlington Experiment Farm, Rosslyn, Virginia, and from the Maryland Agricultural Experiment Station, College Park, Md. Approximately 6 months after the peaches had been canned they were opened and compared as to flavor, color, and texture by a number of judges. The most promising of the varieties tested are summarized in the following paragraph taken from the summary:

"When tree characters such as productiveness, disease resistance, size and shape of fruit as well as the characters of the fruit are taken into consideration, the varieties which appear most promising for canning are Motion Cling, Tuskena, Goodman Choice, with Golden Queen, Ambergem and Paragon forming a slightly less promising group. These are all clingstone varieties, four having non-melting and two semimelting flesh. Of the melting-fleshed varieties tested, Ideal, Up-to-Date, Early Elberta, J. H. Hale and Wilma appear to be most promising."⁵

The Bureau of Plant Industry brings together in a publication⁶ all information existing as of March 1942 in regard to the suitability for canning purposes of all freestone peaches grown in the eastern and southern portions of the United States. Table 6 is taken from this manuscript. It should be pointed out that the factors considered in the grading are strictly limited to those that can be seen and evaluated in the canned product. Obviously a great many other facts, as for example, winter hardiness, productiveness, disease resistance, size of fruit and season of ripening must be taken into consideration in determining the commercial value of a variety. Weakness in some of these factors may make a variety undesirable in spite of the fact that a canned product of high quality may be made from it. It will be seen from table 6 that a small number of varieties combine exceptionally attractive appearance and color, desirable texture, and very good or excellent flavor to such a degree that they are consistently rated as superior, all factors considered, to all others with which they may be compared. Such varieties include the Ambergem, Goodman Choice, Motion Cling, Tuskena, and Vedette.

⁵Culpepper, C. W., Moon, N. H., and Caldwell, J. S. *The Comparative Canning Quality of Some Varieties of Peaches Grown in the East*. *The Canner*, v. 85, No. 6, pp. 11-12, 17-18, 20. July 1937.

⁶*The Canning Trade*, v. 64, No. 45 & No. 47, pp. 7-8, June 22, 1942; pp. 7-8, June 15, 1942.

Table 6. Characteristics of Canned Product and General Suitability for Canning Purposes

Variety	Type ¹	Characteristics of Canned Product ²				General Suitability for Canning Purposes
		Appearance	Color	Texture	Flavor	
		Grade				Rank
A-1	YCSM	2	3	2	2	2 or 3
Admiral Dewey	YSFM	2-3	2-3	3	3	4
Amberger	YCNM	1	1	1-2	1-2	1
Arp	YFM	3-4	2	3-4	3	4
Augbert	YFM	2-3	2-3	3-4	2-3	3
Banner	YFM	3	3-4	2-3	2-3	4
Belle (Georgia Belle)	WFM	2-3	2	3	1-2	4
Billmyer	YFM	2-3	2-3	3	2	3
Brackett	YFM	2	3	3	2-3	3
Captain Ede	YFM	3	3-4	2-3	4	4
Carman	WSFM	3	3	4	3	4
Chairs (Chairs Choice)	YFM	2	2-3	3	2-3	3
Champion	WFM	3	3	3-4	2	4
Chili (Hills Chili)	YFM	2	2	2-3	2-3	3
Cumberland	WFM	3	2	3-4	1-2	4
Dixigold	YFM	2	2	2	3	3
Dralle Golden	YCNM	2	2	2	3-4	3
Early Crawford	YFM	2-3	2	3	2	3
Early Elberta	YFM	1-2	1	1-2	1-2	1 or 2
Early Hiley	WFM	3	2-3	2	1-2	4
Early Rose	WCNM	3	3-4	2	1-2	4
Early Wheeler	WCNM	3	3-4	2	2-3	4
Eclipse	YFM	1-2	1	1-2	1-2	2
Elberta	YFM	2-3	2-3	3	2-3	3
Engle	YFM	3	3-4	2-3	2-3	3
Fay Elberta	YFM	1	1	2	2	2
Flaming Gold	YFM	2	2	2	1-2	2
Fireglow	YFM	2	2	2	2	2
Fitzgerald	YFM	2-3	3	2-3	2-3	3
Foster	YFM	2-3	3	2-3	1-2	3
Frank	YCSM	1-2	2-3	2	3	3
Gage Elberta	YFM	2	2-3	2	2-3	3
Globe Haven	YFM	1-2	1	1-2	1-2	2
Golden East	YFM	1-2	2	2	1-2	2
Golden Globe	YFM	2	2-3	2-3	2	3
Gold Medal						
(Fay Elberta)	YFM	1	1	2	2	2
Golden Jubilee	YFM	2-3	1-2	2	2	2 or 3
Golden Queen	YCNM	2	1	2	2	1 or 2
Goodman Choice	YCNM	1	1	1	2	1
Giant Freestone	YFSM	2	1-2	2	3	3
Greensboro	WSCM	3	2-3	3	2-3	4
Halberta	YFM	3	3	2-3	3	4
Halehaven	YFM	2	1	1-2	1-2	2

Table 6. Characteristics of Canned Product and General Suitability for Canning Purposes (Continued)

Variety	Type ¹	Characteristics of Canned Product ²				General Suitability for Canning Purposes
		Appearance	Color	Texture	Flavor	
		Grade				Rank
Hiley (Hiley Belle)	WFM	3	3-4	2-3	2	4
Heath	WCM	3	3-4	2-3	2	4
Hope Farm	WFM	3-4	4	3-4	3-4	4
Ideal	YFM	2	2	2-3	2	2
July Elberta	YFM	2	2-3	3	1-2	3
J. H. Hale	YFM	2	2	2	2	2
Kalamazoo	YFM	3	3	3	2	3 or 4
Krummel						
(Krummel October)	YFM	3	4	2-3	3	4
Late Crawford	YFM	2-3	2	2-3	1-2	3
Late Elberta	YFM	2-3	3-4	3	3	3
Lemon Free	YFM	2	2-3	2	2	3
Levy Late	YCNM	2	2	2	3-4	3
Lizzie	YFM	2	2	2	1-2	2
Lovell	YFM	3	3	3	4	4
Massasoit	YFM	2	2-3	2-3	2	3 or 4
McDevitt Cling	YCNM	2-3	4	3	3	4
Motion Cling	YCSM	1	1	1	1	1
Muir	YFM	2	2-3	2	3	3 or 4
Niagara	YFM	3	4	3-4	3	4
October Elberta	YFM	2	2	3	1-2	2 or 3
Orange Cling	YCNM	2	2-3	2-3	3	3
Oriole	YFM	2	2	2-3	2	3
Pacemaker Paragon	YCSM	1-2	1-2	1-2	2	2 or 1
Peake Cling	YCNM	2	2-3	2	2-3	3
Phillips Cling	YCNM	2	1-2	1-2	3-4	3 or 4
Primrose	YFM	2-3	4	3	3-4	4
Pullar Cling	YCNM	3-4	4	2-3	4	4
Raritan Rose Rochester	YFM	3	3	3	2-3	3 or 4
Rosalind	YCSM	1	2-3	2	2-3	3
Reeves	YFM	1-2	1-2	2	1	2
Red Berta	YFM	2	2	2	1	2
Roberta	YFM	3	2-3	3-4	2-3	3
Salberta	YFM	2-3	2-3	3	2-3	3
Salway	YFM	2	2-3	2	2-3	3
Sellers Cling	YCNM	2	2-3	1-2	3	3
Shalil	YCNM	1-2	3	3	3	3
Sharrock	YFM	3	3-4	3-4	3	4
Shippers' Late Red	YFM	2-3	2	2-3	1-2	3
Smock (Beers Smock)	YFM	2-3	2	3	1-2	3
Smooth Hale	YFM	2	2	1-2	2	2
South Haven	YFM	1-2	1	2	2	2
St. John	YFM	3	2	3	2	3
Stump	WFM	3	3	2-3	1	4
Sunbeam	YCSM	1-2	1	1	1-2	2 or 1

Table 6. Characteristics of Canned Product and General Suitability for Canning Purposes (Continued)

Variety	Type ¹	Characteristics of Canned Product ²				General Suitability for Canning Purposes
		Appearance	Color	Texture	Flavor	
		Grade				Rank
Sunglo (So. Haven)	YFM	1-2	1	2	2	2
Sunhigh	YFM	1-2	1	1-2	1	2
Sutter Creek	YCNM	2-3	3-4	2	3-4	4
Slapfey	YFM	2-3	2	3-4	1-2	3
Triogem	YFM	2	2	1-2	1-2	2 or 3
Tuskena (Tuscan)	YCNM	1	1-2	1	1-2	1
Up-to-date	YFM	1	1	2	2	2
Valiant	YFM	2	2	2	2	2
Vedette	YFM	1	1	1	1	1
Wilma	YFM	2	2	2	2-3	3
Yellow Hiley	YFM	2	2	3	1-2	3

¹The following abbreviations are used to indicate color and character of flesh: YFM - yellow freestone with melting flesh; YCM - yellow cling melting flesh; YFSM - yellow freestone semimelting flesh; YCNM - yellow cling, nonmelting flesh; YCSM - yellow cling, semimelting flesh; WFM - white free, melting; WCM - white cling melting; WSCM - white semicling, melting; YSPM - yellow semifree melting.

²A numerical grade of 1 indicates excellent or highest quality; 2 very good; 3 good or fair; 4 mediocre to very poor or unacceptable.

Source: Caldwell, J. S., Varietal suitability for canning purposes of peaches grown in the East with methods of handling to optimum quality, U. S. Dept. of Agr., 10 pp., 1942. (Mimeo.)

About one-fourth of the total number of varieties came somewhat short in some respects of the all-round excellence of the first group but have a degree of attractiveness in appearance and a dessert quality which makes them readily or highly acceptable. The varieties included in this group are Eclipse, Early Elberta, Halehaven, and J. H. Hale. More than 40 varieties are classified as fair for the reason that while their canned products are acceptable and palatable they are, as a class, somewhat deficient in flavor and poor in texture as compared with the preceding groups and are not especially outstanding in color and general appearance. They are acceptable to consumers, as shown by the fact that Elberta, the principal variety at present commercially canned, is a typical member of this group. The varieties ranked fourth are regarded as definitely unpromising for canning purposes. As a class they are poor to very poor or uninviting in flavor and mediocre or poor in other respects. All white varieties are included in this group for the reason that their color and general appearance are such that consumers are generally reluctant to accept them even though some of them, as for example the Belle, are very good to excellent in flavor.

In the spring of 1942, the Bureau of Plant Industry, obtained a number of varieties of commercially canned peaches from California, New Jersey, New York, Michigan, Oregon, and South Carolina and had

several individuals rate them for appearance, color, texture, and flavor. The final ratings of the varieties after combining the ratings on individual factors were as follows:

<u>Excellent</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
Ambergem	Eclipse	Flaming Gold	Augbert
Vedette	Early Elberta	Fireglow	Elberta
	Elberta Sport	Lizzie	Gage Elberta
	Fay Elberta	Red Berta	Halberta
	Globehaven	Triogem	Salberta
	Golden East	Valiant	Shippers' Late Red
	Halehaven		
	Sunbeam		
	Golden Jubilee		

In 1940 the South Carolina General Assembly gave concrete evidence of the importance of peach processing to growers in the Southeastern States by appropriating funds for the establishment of a horticultural products laboratory. As a result in 1941 a building was constructed and the necessary equipment installed to enable the South Carolina Experiment Station to study the possibilities of processing peaches produced in the State. During the 1941 season, this laboratory canned 36 varieties of peaches, using standard commercial canning operations as far as possible. The characteristics of these varieties canned in 1941 are shown in table 7.

Of the many varieties of peaches shown in table 6, a few are produced in commercial quantities. These include the Augbert, Early Elberta, Elberta, Golden Jubilee, Halehaven, and the Shippers' Late Red. The canned Augbert was considered to be of fair color and fair flavor. It must be processed in the soft-ripe stage, otherwise the flesh tends to have a green cast. The early Elberta had excellent and uniform light yellow color and from good to excellent flavor. When canned too ripe considerable stringiness was exhibited but when canned firm a very fine product was produced. The Elberta is the most important variety produced in many commercial peach growing areas. It was found that a product of good flavor and texture was produced if canned in the right manner. They should be canned during the soft-ripe stage if a uniformly yellow color flesh is to be produced. When canned too early the peaches are hard and show an undesirable green color. When canned too soft, they tend to break up in the can. Golden Jubilee was found to be rather soft and consequently broke up easily during canning. The color was light yellow and the flavor excellent and distinctive. After canning, the halves tend to flatten out. The Halehaven showed the best canning characteristics of all the freestone varieties. The color and flavor were considered excellent while the flesh was still in a firm state. The Shippers' Late Red was considered to be one of the better peaches for canning among the late varieties. The color was rated fair and the flavor good. It has a deep red pit cavity which discolors after canning.

In considering the suitability for canning purposes of the various peach varieties, it is well to keep in mind that only a few of these varieties are in commercial production to any great extent. For example, the percentage of the total bearing and nonbearing trees in South Carolina represented by the important varieties as of October 1, 1940, were:

<u>Variety</u>	<u>Percentage of Total Trees</u>
	<u>Percent</u>
Elberta	65.0
Hiley	9.9
Golden Jubilee	6.7
Early Rose	1.7
Other varieties	16.7
Total	100.0

Source: Orchard Letter No. 1, January 1941, Clemson Agricultural College and Extension Service, U. S. Dept. of Agr.

The data available on the tree survey in Georgia indicates the following relationship for important peach tree varieties as of 1942:

<u>Variety</u>	<u>Percentage of Total Trees</u>
	<u>Percent</u>
Elberta	38.6
Hiley	28.4
Early Elberta	7.5
Early Rose	6.7
Uneda	3.0
Other Varieties	15.8
Total	100.0

Source: Summary of Peach Tree Survey, 1942, College of Agricultural and Extension Service, U. S. Dept. of Agr., Athens, Ga.

The Hiley is not considered a good canning peach because it is white-fleshed. In the various canning experiments undertaken the Elberta has been rated from poor to good, but never higher than good. The Golden Jubilee has received a fairly consistent rating of good in the experiments referred to. One large commercial canner in Georgia, however, disliked this variety because it did not stand up in the canning process. The other three varieties of commercial importance in South Carolina and Georgia are white-fleshed.

Harvesting Problems

Proper harvesting is one of the most important factors to be considered in canning peaches. One of the reasons for this is that the freestone peach is in optimum condition for canning for a very short period. Prior to the attainment of this condition it is pale in color and too hard and flavorless to be desirable while later the pieces are ragged and unattractive in appearance. The best canning stage is when the fruit is still firm enough to keep its form in processing and has

nearly reached its maximum in sweetness and appealing flavor. This condition is reached 4 to 5 days after the stage at which fruit is usually picked for rail shipment to distant markets, 2 to 3 days after it would be harvested for nearby markets, or 1 day before most persons would term the fruit prime eating ripe. For any individual fruit, the best canning stage is not more than 2 or 3 days in length.

This situation calls for special care in harvesting. The trees should be picked over at least every other day and the pickers should be carefully trained to recognize the stage of ripeness desired. In the Southeastern States these requirements present a real problem. The producers and the pickers have trained themselves to pick fruit for sale in the fresh market and consequently find it difficult to hold back on picking until the proper stage of maturity is reached. To overcome this difficulty a vigorous educational campaign may be needed.

Coupled with the problem of picking the fruit at the proper stage of maturity is the question of carefully handling the fruit that is picked. Peaches ripe for canning are more easily damaged than fruit for the fresh market. To avoid bruising and cutting the fruit, the use of gloves by the pickers, shallow and small picking bags and field boxes, and shelters for protecting the fruit from the sun while awaiting transfer to the cannery are advocated.

While educating pickers in the proper procedure might guarantee perfect fruit, a rapid turn-over in harvesting labor - a rather normal situation - makes this difficult. In fact the comment is frequently heard that it is necessary "to teach a new crew every morning." The short season militates against relying on trained picking crews that can be moved from place to place as the fruit matures. Within a given area most of the orchards need picking at about the same time which means that a large number of pickers are needed for a short period. For any given variety the average harvesting period is only from about 10 to 14 days. For individual orchards, the period may be even less than 10 days.

Canning Plant Problems

The canning season lasts only a few weeks. This means that the canning of any large volume of peaches is dependent upon facilities having the capacity to handle a large volume in a short space of time. For a given volume larger plant capacity is required for canning peaches than for other commodities that have a longer harvesting period. The advisability of establishing a cannery to can only peaches is problematical because fixed costs per unit may be too high to enable the cannery to compete with other canners. A group interested in establishing a peach cannery should consider whether or not other canning crops are available to lengthen the canning season.

The importance of this problem is brought out in a recent study of the cooperative canning of fruits and vegetables.⁷

According to this study one-fifth of the cooperative canneries pack four-fifths of the cooperatively canned fruits and vegetables. The cooperative canneries with large sales volumes also had, on the average, comparatively long canning seasons and tended to can a great number of products. They also were in better financial condition and tended to return to their growers a relatively greater portion of the sales proceeds than the smaller canneries.

Experiments on the feasibility of extending the peach canning season by storing peaches under various temperatures have been undertaken. It would be highly advantageous if the canner could take the supplies of peaches as offered and then store the surplus until it could be handled. The research work undertaken indicates that although common storage does not arrest the ripening process, the material increase in flavor and palatability does not take place as it does when the fruit has been removed from the tree. Consequently, common storage apparently offers no possibilities as a means of holding fruit for any considerable period. In some varieties of peaches it is desirable, however, to put the peaches in common storage for 2 or 3 days to develop uniformly ripe fruit.

Storing the raw product at different temperatures has also been tried. Peaches held at temperatures between 60 and 70 degrees F. can be kept for about a week before canning. When held at 32 degrees F. they can be kept for almost a month. While there is no apparent change in color, firmness of flesh, and general appearance, such fruit suffers a slightly progressive decline in flavor as the length of the storage period increases.

Lye peeling is essential for economical peach canning. The method employed for clingstone peaches, however, is too drastic for tree-ripe freestones. This method consists of agitating previously halved and stoned fruit in a revolving drum first in a tank of diluted boiling lye solution, and then in one of water. Tree-ripe freestone peaches are softened by the boiling lye and crushed by tumbling and pressure in the rotating drums. A gentler method consists of placing the halved and stoned fruit in slat crates or baskets, which are immersed first in a lye solution and then in water. The solution and water are gently agitated. Another method consists of placing the fruit, stone cavity down, on belts which pass under sprays of live steam for 1 to 1½ minutes in a steam box, after which the peels are slipped off by hand and the pieces placed in the cans.

⁷Fogelberg, N. and Leith, W. G., *Cooperative Canning of Fruits and Vegetables*, F.C.A. Bull. 47, 78 pp., Illus. 1941.

Lengthening the Canning Season

Peach canneries can lengthen their canning seasons by one or both of two general methods: (1) beginning canning operations with the early varieties and continuing through the late varieties; and (2) supplementing peach canning with the canning of other products.

The South Carolina Experiment Station, Clemson, S. C., has considered the possibility of extending the canning season by canning a number of varieties.⁸ The ripening period of 14 varieties of peaches, which yield well in South Carolina and which produce a good to excellent canned product, had picking dates covering the period from July 5 to September 4 in 1941, as follows:

<u>Variety</u>	<u>Picking Dates - 1941</u>
Golden Jubilee	July 2 - 16
Sunbeam	July 10 - 15
Ambergem	July 12 - 26
Vedette	July 14 - 27
South Haven	July 14 - 29
Valiant	July 16 - 28
Hale Haven	July 16 - 31
Globe Haven	July 19 - 28
Early Elberta	July 22 - Aug. 7
Elberta	July 26 - Aug. 13
Halberta	July 29 - Aug. 15
Shippers' Late Red	Aug. 6 - Aug. 16
Lizzie	Aug. 15 - Aug. 27
Augbert	Aug. 20 - Sept. 4

The Experiment Station is trying out several additional varieties which mature before the Golden Jubilee, with the hope that these new varieties may lend themselves to canning.

Many of the above varieties are produced in insufficient quantities to provide canners with adequate volume. Consequently, lengthening the canning season by this means involves the development of a planting program which will supply sufficient quantities of the needed varieties. Since the foundation of such a program would be the cooperation of the growers, a cooperative association may be successful with such a program. If the growers were assured of a canning outlet for their peaches, the shift in peach varieties should not be too difficult of accomplishment. If space for the additional varieties depended upon pulling out some trees, these trees could be removed after harvesting the fruit, the land prepared during the winter months, and the new varieties planted in the spring. For the 2 or 3 years when no fruit was obtained from these new plantings, cotton might be planted between the rows of trees.

⁸Fifty-Fourth Annual Report of the South Carolina Experiment Station of Clemson Agricultural College, Clemson, S. C., 182 pp., 1941.

Table 7. Production of fruits and vegetables in Selected States, 1939

Commodity	Unit	Georgia	North Carolina	South Carolina
Berries:				
Blackberries & Dewberries	Quarts	62,372	2,083,248	72,157
Blueberries	"	16,752	116,323	-
Raspberries (tame)	"	12,280	124,053	3,182
Strawberries	"	640,154	10,268,100	674,667
Orchard Fruit:				
Apples	Bu.	1,140,568	3,395,343	363,118
Cherries	lbs.	275,552	1,970,081	191,251
Peaches	bu.	4,359,625	1,401,168	2,043,651
Pears	"	304,189	256,785	131,404
Plums & Prunes	"	57,269	55,112	25,110
Grapes	lbs.	2,796,548	10,837,960	2,408,914
Figs	"	1,447,133	762,497	597,739
Apricots	bu.	-	313	95
Quinces	"	426	144	26
Pomegranates	"	413	-	161
Vegetables:				
Asparagus	dollars	55,408	-	373,737
Beans, lima (green)	"	239,593	192,569	194,180
Beans, snap, string or wax	"	438,275	555,000	424,299
Beets	"	8,653	28,469	17,529
Broccoli	"	-	13,501	43,190
Cabbage	"	205,084	568,651	517,873
Cantaloup, muskmelon	"	-	-	-
Honeydews, etc.	"	215,473	315,468	164,958
Carrots	"	-	22,585	13,612
Collards	"	42,773	-	11,362
Corn, sweet	"	65,119	159,094	46,505
Cucumbers	"	80,158	288,712	205,495
Kale	"	-	9,798	-
Lettuce	"	27,355	131,394	70,436
Okra	"	82,953	12,416	15,449
Onions (dry)	"	20,638	32,652	13,207
Onions (green)	"	5,976	-	-
Peas (green)	"	118,468	165,206	137,282
Peppers (hot)	"	-	-	23,540
Peppers, sweet & pimentos	"	514,084	274,625	25,091
Radishes	"	-	21,210	-
Spinach	"	16,452	14,046	12,601
Squash	"	37,937	39,586	28,889
Tomatoes	"	385,345	230,553	440,278
Turnips	"	89,645	22,617	25,291
Turnip Greens	"	7,548	-	-
Watermelons	"	845,158	403,308	484,991
Mixed Vegetables	"	66,849	123,594	-

Source: 16th Census of the United States, U. S. Dept. of Commerce.

The other method of lengthening the canning season is to supplement peach canning with other products, but this depends upon whether other canning products are available within the area normally served by the cannery, or could be brought in from more distant areas on an economical basis. If not, the question would arise as to whether the area is suited to production of other fruits or vegetables for canning and whether the growers could raise them on a profit basis at least as attractive as other products raised. A rather comprehensive analysis would have to be made to obtain answers to these questions for a given location, and an analysis made for one area would not necessarily apply to another.

Data are available to indicate in a general way the possibilities of this method. The production of different fruits and vegetables in Georgia, North Carolina, and South Carolina for 1939 is shown in table 7.

Table 7 indicates that a number of fruits and vegetables are grown in sufficient quantities in each State to supplement peach canning. Only a few items listed are not commonly canned, such as cantaloups and like melons, collards, kale, lettuce, dry onions, radishes, and water-melons.

The importance of individual fruits and vegetables varies between States. The important fruits and vegetables grown in Georgia, other than peaches, include strawberries, apples, cherries, peas, green beans, sweet and pimento peppers, and tomatoes. In North Carolina the important crops are blackberries and dewberries, strawberries, apples, green beans, lima beans, sweet corn, cabbage, cucumbers, green peas, sweet and pimento peppers, and tomatoes. For South Carolina a similar listing includes strawberries, apples, pears, asparagus, green beans, lima beans, cabbage, cucumbers, green peas, and tomatoes.

Whether these fruits and vegetables are produced in substantial quantity in the principal peach producing sections is the next problem. Proximity of these crops to a peach cannery helps to determine their value as supplemental crops, because of the perishability of most fruits and some vegetables and the factor of transportation. Production of the principal fruits and vegetables that could be canned in each State is shown in table 8 for the principal peach producing counties.

The principal peach producing areas are important as a source of some fruits and vegetables for canning and unimportant for others. In Georgia a substantial percentage of the State production of pimentos and sweet peppers is grown in the principal peach areas. A lesser but important percentage of the apples is also raised in these areas. The principal peach sections of Georgia are a poor source for cherries and snap or wax beans. The principal peach sections of North Carolina produce a substantial percentage of the total State production of blackberries and dewberries but relatively small quantities of other important fruits and vegetables. The principal peach sections of South Carolina

Table 8. Availability of Supplemental Canning Crops in Principal Peach Producing Areas¹ of Selected States.

State and Commodity	Production within Principal Peach Producing Areas			Approximate Harvesting Period
	Unit	Quantity	Percentage Of State Total	
			<i>Percent</i>	
Georgia:				
Strawberries	quarts	41,756	6.5	May 1 - 30
Apples	bu.	176,695	15.5	Aug. 15 - Oct. 15
Cherries	lbs.	14,874	5.4	May 10 - June 1
Pears	bu.	29,424	9.7	Aug. 15 - Sept. 15
Beans, green	dollars	17,044	3.9	May 25 - Oct. 15
Peppers, sweet & pimentos	"	317,297	61.7	May, June & Aug 15 - Oct. 15
Tomatoes	"	9,426	2.4	June 1 - Sept. 15
North Carolina:				
Blackberries & Dewberries	quarts	536,121	25.7	May 15 - Aug. 10
Strawberries	"	76,682	7.5	April 15 - June 10
Apples	bu.	207,900	6.1	Aug. 1 - Oct. 1
Beans, green	dollars	7,417	1.3	May 15 - Nov. 15
Beans, lima	"	7,649	4.0	June 15 - July 30
Corn, sweet	"	3,283	2.1	June - Aug.
Cabbage	"	7,533	1.3	April 10 - Dec. 31
Cucumbers	"	408	.1	May 25 - July 25
Tomatoes	"	9,816	4.3	June 10 - Aug. 1
South Carolina:				
Strawberries	quarts	151,188	22.4	May 1 - 25
Apples	bu.	122,176	33.6	Aug. 20 - Nov. 1
Pears	bu.	29,792	22.7	Aug. 20 - Oct. 15
Asparagus	dollars	174,600	46.7	April 1 - May 25
Beans, green	"	15,232	3.6	May 15 - June 15 & Oct. 10 - Nov. 1
Beans, lima	"	21,032	10.8	June 10 - July 15
Cabbage	"	11,648	2.2	April 15, May 25 & Nov. 15 - Feb. 15
Cucumbers	"	1,990	1.0	May 15 - June 20
Peas, green	"	11,136	8.1	April 1 - May 15
Tomatoes	"	52,058	11.8	June 15 - July 15 & Sept. 1 - Oct. 15

¹Principal areas are those counties which produced more than 50,000 bushels of peaches in 1939. They are as follows: Georgia: Coweta, Crawford, Habersham, Henry, Houston, Jackson, Jasper, Jones, Macon, Meriwether, Morgan, Peach, Pike, Spalding, Talbot, Taylor, and Upson; North Carolina: Cleveland, Montgomery, Moore, Richmond, Rutherford, Surry; South Carolina: Edgefield, Greenville, Laurens, Lexington, Saluda, Spartanburg, York.

Source 16th census of the U. S. 1940, U. S. Dept. of Commerce.

produce relatively large quantities of strawberries, apples, pears, and asparagus, but relatively small quantities of the other important vegetables.

When individual peach producing counties are considered it is found that only certain of these counties are important as a source of other fruits and vegetables. For example, Habersham County produced 130,708 bushels of apples of the 176,695 bushels of apples produced in the principal peach sections combined. Likewise Meriwether and Pike Counties produced 41 percent of the total production of sweet peppers and pimentos in the principal peach sections of Georgia. The same situation exists in North Carolina and South Carolina. The blackberries of North Carolina are produced mainly in Moore County (373,637 quarts) and the asparagus of South Carolina is produced mainly in Edgefield (\$88,289) and Saluda (\$68,513) counties.

When important fruits and vegetables are not in close proximity to peach canneries located in the principal peach sections, the question arises as to how long a haul is involved in obtaining such products. A peach cannery located in Upson County, Georgia, which is central for this peach section, would have the following approximate hauls to reach the center of the county producing the largest quantity of the specified commodity: Strawberries 160 miles; apples 145 miles; green beans 160 miles; peppers and pimentos 20 miles; and tomatoes 170 miles. If the cannery were located in Habersham County, the other principal peach section, the distances would be - strawberries 135 miles; apples in immediate vicinity; green beans 300 miles; peppers and pimentos 125 miles; and tomatoes 300 miles.

North Carolina has three areas where peach production is particularly heavy. These areas are in the vicinity of (1) Troy, Moore, and Richmond Counties; (2) Rutherford and Cleveland Counties, and (3) Surry County. The length of haul involved in reaching the principal county in the production of specified fruits and vegetables from the first two areas would be approximately as follows:

<u>Commodity</u>	<u>Approximate distance from center of N. C. county producing largest quantity of specified commodity to:</u>	
	<u>Norman, N. C.</u>	<u>Shelby, N. C.</u>
	<u>Miles</u>	<u>Miles</u>
Strawberries	130	260
Beans, green	170	275
Cabbage	180	120

A similar table for the two principal peach production sections of South Carolina is as follows:

Approximate distance from center
of S. C. county producing largest
quantity of specified commodity to:

<u>Commodity</u>	<u>Spartanburg, S. C.</u>	<u>Saluda, S. C.</u>
	<u>Miles</u>	<u>Miles</u>
Asparagus	100	20
Beans, green	190	130
Cabbage	220	150
Tomatoes	240	160

A peach cannery located in Spartanburg, S. C., could obtain cabbage from Watauga County, N. C., by traveling approximately 140 miles.

The significance of these distances can be judged from an analysis of the maximum distance that the product to be canned is hauled from the farm to the cannery by cooperative fruit and vegetable canneries located in various sections of the United States.

<u>Maximum Distance</u>	<u>Cooperative Fruit and Vegetable Canneries</u>
	<u>Number</u>
Less than 6 miles	9
6 to 10 miles	13
11 to 15 miles	1
16 to 20 miles	4
21 to 30 miles	4
31 to 40 miles	1
41 to 50 miles	2
51 to 100 miles	1
101 or more miles	3

Source: Fogelberg, N., and Leith, W. G., *Cooperative Canning of Fruits and Vegetables*, F.C.A. Bul. 47, 78 pp., illus. 1941.

In the bulletin to which reference is made, the range in length of haul was from 2 to 150 miles. This is generally less than the distances given for supplementing peach canning in the Southeast. In this connection, it should be recognized that these various supplemental crops could be obtained from sources nearer the hypothetical peach canneries, but the quantities available would be less.

Most of the fruits and vegetables shown in table 8 will fit in well with peach canning as far as the harvesting period is concerned. Lima beans and tomatoes are the only vegetables harvested during part of the peach season.

Marketing Southeastern Canned Peaches

The peach canners in the Southeastern States have had the reputation of packing cull fruit of poor quality. This was particularly true before the Food and Drug Administration issued regulations pertaining to canned peaches. The canned peach industry at that time was a cull proposition and apparently control over quality was lax.

The regulations (see appendix) issued by the Food and Drug Administration define the varietal groups of peaches that may be canned, the form of the units, such as whole, halves, sliced, etc., the optional packing media permitted such as water, peach juice, sirup, etc., and the nature of the spice used, if any. Tests are set up for tenderness of peach ingredient; size of units in the case of peach halves and quarters; uniformity of size of units in the cases of whole peaches, halves and quarters; absence of peel in all forms of the peach unit except in the case of unpeeled peaches; freedom from blemishes; shape of units in the case of whole peaches, halves, quarters, and slices; freedom from crushed or broken units, except in the case of mixed pieces of irregular sizes and shapes. The regulations require that the label give a description of the contents of the can including the peach ingredient used, the packing medium used, the kind of seasoning used, if any. In the event the contents do not meet the quality requirements, the canner must show on the label that the contents are substandard and in what respect.

With the issuance of standards, the quality of the peach pack of the Southeastern States was improved. Such seizures as are now made by the Food and Drug Administration consist mainly of peaches that are immature, of variable size, or blemished. Canned wormy peaches are now seldom seen.

In the minds of the canned food buyers, however, considerable improvement can still be made in the quality of the pack. One large buyer stressed the necessity of having a nice appearing canned peach of dependable quality. From time to time this buyer has purchased a few Southeastern canned dessert peaches, on an experimental basis, but each time decides against handling them because of immature peaches and too much variability in the pack. This buyer handles Southeastern pickled peaches which he considers to be of very good quality.

Another large buyer gave a similar report, although this firm generally handles some Southeastern canned peaches. This buyer stated that the pack was ragged in appearance and not dependable. One can may contain a good colored, uniform sized fruit, and the next can hard green fruit of varying sizes. This lack of dependability varied with individual packs and with canners. According to this buyer, Southeastern canned peaches can only be sold in competition with California canned peaches when the prices are sufficiently lower to compensate for the difference in quality. As an illustration, this buyer's purchases of Southeastern peaches represented less than 3 percent of total canned peaches purchased in 1940 whereas they represented approximately 27 percent of the 1941 purchases. The buyer stated that in 1940 the prices of

Southeastern and California canned peaches were fairly close, whereas in 1941 because a large supply of Southeastern canned peaches was available, they sold at a 34 percent lower retail price than California canned peaches.

As a means of checking the statements relating to prices, opening canners price lists were obtained on the 1941 pack of Georgia peaches and on California peaches. According to these price lists, Georgia yellow peaches, packed as halves in light syrup listed at \$1.25 per dozen No. 2½ cans, as compared with California yellow cling peaches, packed as halves, standard quality for \$1.75 per dozen No. 2½ cans. The same packs in No. 10 cans, listed for \$4.50 per dozen for Georgia peaches and \$5.75 per dozen for California peaches. The listed prices for Georgia and California yellow peaches packed as halves in water (water pack) were much closer than for the syrup packs. The water pack yellow peaches in No. 10 cans listed at \$4 per dozen for Georgia peaches and \$4.25 per dozen for California peaches.

The above comparisons are not strictly comparable since the Georgia peach is a freestone whereas the California peach is a clingstone. When California yellow freestones were listed, they were quoted at a premium of 20 cents a dozen of No. 2½ cans over the same quality California yellow clingstone peaches. Thus the price differential between Georgia canned peaches and California canned peaches is even greater if the same varietal groups are considered.

The above prices are f.o.b. loading point which would favor the Georgia canners on a competitive price basis as far as the Eastern markets were concerned.

An attempt was made to carry the price comparison through to the consumer. For this purpose the leading newspapers in Atlanta, Ga., Columbia, S. C., and Jacksonville, Fla., were checked for advertisements of canned peaches by retailers during January, February, March, November and December for the years 1939, 1940 and 1941 and January 1942. This search revealed a large number of advertisements for known California brands, but very few, except during 1941, for known brands of Southeastern canned peaches. During November and December of 1941, Southeastern canned dessert peaches were advertised at 2 No. 2½ cans for 25 cents and one No. 2½ can for 15 cents as compared with one No. 2½ can of California dessert peaches at 17, 19, or 21 cents depending upon the brand. Such information as was available tended to confirm the statements of the canned food buyers that Southeastern canned peaches sold at relatively lower prices when the supply of such peaches was larger than normal.

The marketing agreement regulating the handling of fresh peaches grown in Georgia is on a grade, size, and maturity basis. This means that only the better grades of peaches will be marketed in interstate commerce, thus leaving the lower grades for markets within the State

and for processing. The growers desire to market the whole crop, particularly since grading does not take place until after the fruit has been picked. Under these circumstances the growers tend to look even more to the processors as an outlet for the lower grades of fruit. They realize that receiving even a small amount for the poorer fruit is better than nothing.

Many of the canners, on the other hand, realize the importance of packing a quality product, and consequently do not share the view that the canners should be primarily an outlet for the poorer grades of fruit. On the contrary, several expressed the idea that a "must" for a sound peach canning program is a regulation preventing the use of cull and low grade fruit for canning purposes. These canners feel that the marketing agreement regulating fresh fruit should be followed by a marketing agreement for regulating fruit to be canned.

The operation of the marketing agreement and the attitude of the growers and canners toward the lower grades of fruit raise the question as to how the peach crop actually grades out. Federal State shipping point inspections furnish very helpful information in answering that question (table 9).

Table 9. Georgia Peaches Inspected by Federal State Shipping Point Inspection Service by Grades 1937 to 1941

Grade	1941	1940	1939	1938	1937
<i>Cars</i>					
U. S. Fancy	-	7	-	19	-
U. S. Extra No. 1	3,087	1,602	878	2,149	320
U. S. No. 1	1,661	1,627	1,164	1,801	910
Mixed Grades	343	158	381	531	313
U. S. No. 2	474	-	313	11	2
Other	17	427	2	230	108
Total	5,582	3,821	2,738	4,831	1,653
Grade	1941	1940	1939	1938	1937
<i>Percent</i>					
U. S. Fancy	-	.2	-	.4	-
U. S. Extra No. 1	55.3	41.9	32.1	44.5	19.4
U. S. No. 1	29.8	42.6	42.5	39.1	55.1
Mixed Grades	6.1	4.1	13.9	11.0	18.9
U. S. No. 2	8.5	-	11.4	.2	.1
Other	.3	11.2	.1	4.8	6.5
Total	100.0	100.0	100.0	100.0	100.0

Source: Agricultural Marketing Administration U. S. Dept. of Agr.

The Federal State inspections shown in the above table represent the major portion of the Georgia peach crop entering interstate marketing channels for the respective years. During the 1941 season, the Federal State Inspection Service inspected 83 percent of the movement by rail.

For the 5 year period combined 82.2 percent of the total cars inspected were graded U. S. No. 1 or better. For the individual years, the percentage of total cars grading U. S. No. 1 or better ranged from 74.5 percent in 1937 to 85.1 percent in 1941. This peak came in 1941 because the large crop and the low prices prevailing tended to force the growers to ship only the better grades of fruit. According to the supervising inspector, three main factors were responsible for the fruit not grading U. S. No. 1 or better. These factors were immature peaches, worm damage, and cuts.

The grade restrictions imposed by the Federal Marketing agreement restrict the shipment of peaches to those meeting the requirements of a modified U. S. No. 1 grade. Whereas U. S. No. 1 grade does not tolerate damage from split pits, the rules under the marketing agreement allow the shipment of peaches with split pits causing either damage or serious damage providing the other requirements are met. Also the tolerances allowed under the marketing agreement regulations are more liberal than for regular U. S. No. 1 grade. For example, the percentage of peaches that may contain defects is raised from 10 to 15 percent for any lot of packages and an amount not exceeding 5 percent can consist of peaches with worms or wormholes. This modification of the U. S. No. 1 grade permits the shipment of relatively more peaches than table 9 indicates.

The Federal State inspections of all varieties of peaches from all Georgia districts for the 1942 season show the following distribution: U. S. Extra No. 1, 20.3 percent; U. S. No. 1, 55.5 percent; 85 percent No. 1 quality, 19.6 percent; 80 percent No. 1 quality, 2.9 percent; 75 percent No. 1 quality, 0.7 percent; 70 percent No. 1 quality or less 1.0 percent.

The 15 to 25 percent of the crop moving into interstate marketing channels that is below U. S. No. 1 grade does not represent all the peach crop that is of lower quality. To this must be added that portion of the crop below U. S. No. 1 grade that is sold within the State as fresh fruit and to processors, and that portion failing to reach any market. Considering all the fruit below U. S. No. 1 grade, it appears that the quantity is a rather substantial percentage of the whole peach crop. The relative importance of this fruit, together with the conflicting viewpoints of growers and canners, presents a difficult marketing problem.

Costs

Data relating to the cost of producing, harvesting, canning, and marketing peaches in the Southeastern States are meager. It is not within the scope of this report, however, to make original research in determining the cost of performing these various functions.

Apparently the latest bulletin that analyzes the cost of producing peaches in the Southeast is one that was published in 1927.⁹ According to this study, it costs from 50 cents to \$1.50 to produce 1 bushel of peaches. The cost, f.o.b. local station, peaches packed, averaged from 91 cents to \$1.03 per bushel depending upon the area of production. These total cost figures included labor, harvesting costs other than materials, spray materials, other materials, packing, taxes, reserves, overhead, and interest on orchard and equipment. The provision for reserves, interest and overhead on a per bushel basis is about equal to the average sales commission, approximately 20 cents per bushel. Thus, if such costs were eliminated and sales commission added, the average cost would still approximate from 90 cents to \$1.00 per bushel. These figures are slightly higher than estimated cost figures, under present conditions, supplied by the secretary of several cooperative associations. These sources estimated the cash cost of producing the fruit up to the harvesting stage at 20 to 22½ cents per bushel, the cash cost of harvesting and getting the fruit to the packing shed at 12½ to 15 cents per bushel, and the cash cost of packing and selling at 50 cents per bushel - a total of 82½ to 87½ cents per bushel. Such data as are available seems to indicate that in order to break even the grower should receive on the average approximately 90 cents per bushel for his fruit. Allowance should be made for the difference in fruit quality and size.

Data on the cost of canning peaches in the Southeastern States are scarce. In 1941 the South Carolina Experiment Station of Clemson Agricultural College undertook a study of commercial canneries in South Carolina.¹⁰ According to this study, it cost 11 commercial fruit and vegetable canneries in South Carolina an average of \$1.337 per case to pack their products as follows:

<u>Cost Item</u>	<u>Per Case</u>
Raw Products	\$0.318
Cans and Cases	0.537
Labor	0.200
Storage	0.001
Selling	0.076
Depreciation	0.042
Rent	0.015
Miscellaneous fixed costs	0.066
Miscellaneous variable costs	0.081
Allowances	0.001
Total	<u>1.337</u>

Since products other than peaches are included among the fruits and vegetables canned by these canneries, the total cost of \$1.34 per case

⁹Jensen, W. C., *Economics of Producing and Marketing South Carolina Peaches*, U. S. Dept. of Agri. Bul. 239, 51 pp. 1927.

¹⁰Steph, J. M. *Economic Study of Commercial Canneries in South Carolina* (in press).

is only the approximate cost of canning peaches. For example, the cost of the raw product should be approximately 55 cents instead of 32 cents, based on the usual price this past season of 60 cents per bushel for canning peaches.¹¹ That would raise the total cost of canning to \$1.58 per case. If growers are paid \$1.00 a bushel the total cost of canning per case would approximate \$1.95 per case.

The cost of marketing is indicated by contracts in existence which provide a 10 percent commission for labels, labeling, selling, and financing the unsold pack.

PROCESSING OTHER THAN CANNING

While canning is perhaps of greatest interest to the peach industry in the Southeast, there are other types of processing that should be considered briefly. These are processing with sulphur dioxide, freezing, and dehydration.

Sulphur Dioxide

During the past two seasons, Southeastern peaches have been processed in sulphur dioxide solutions to make a peach marmalade for export to Great Britain. The Agricultural Marketing Administration has purchased the fresh peaches and then contracted with canners for processing. This type of processing is related directly to the war since peaches processed with sulphur dioxide solution are exported.

This type of processing is primarily an adjunct to canning since the same equipment is needed to prepare the fresh fruit for processing as for canning, such as the graders, sizers, and lye-peeling equipment. This factor together with the restricted demand would not warrant engaging in this type of processing as a main undertaking.

The quality of the product produced in 1941 was not as good as desired. In order to improve the quality, the Georgia Experiment Station undertook laboratory research along this line in the spring of 1942.

Freezing

Freezing lends itself to the preservation of most fruits, including peaches. Research work on the problem of freezing has been carried on for several years by such agencies as the Bureau of Plant Industry, United States Department of Agriculture, and the Georgia Experiment Station.

Many of the problems involved in freezing peaches are those encountered in connection with canning. For example, variety is outstandingly important in determining market appearance and dessert quality. The

¹¹One pound canned peaches equals 1 pound of fresh peaches and 48 pounds of fresh peaches make 1 bushel.

Georgia Experiment Station considers the Hale, Halehaven, and Georgia Belle as suitable varieties.¹² Picking the fruit at the proper stage of maturity is important to obtain desirable flavor. As in the case of canning, the best stage of maturity is as near the full-eating-ripeness stage as possible.

Preserving peaches by freezing introduces some additional problems. Perhaps the greatest of these is browning. Peaches turn brown before they are frozen, while in freezing storage, and while being thawed in preparation for serving. By the use of proper methods, browning can be held to a minimum during the first two stages. Immediate consumption after thawing appears to be necessary. The use of containers holding only one serving may be desirable in the case of dessert peaches. This tendency to turn brown places a limitation on the uses of frozen peaches. The largest outlet seems to be the ice cream industry.

Dehydration

War always revives the drying or dehydration industry and the present war is no exception. Consequently considerable interest has been shown in the Southeast in the possibilities of dehydration.

Commercial dehydration of peaches has not taken place in the Southeast. Representatives of the Bureau of Chemistry and Engineering, United States Department of Agriculture, are of the opinion that opportunities for developing such processing are not good because the varieties of peaches grown are not as well adapted to dehydration as peaches grown in some other parts of the country.

As in the case of freezing, dehydration requires the same preliminary treatment of the fruit as is required for canning. Consequently dehydration should be carried on as an adjunct to canning.

The Tennessee Valley Authority this past spring developed some plans for a dehydrator. These plans were tested during the 1942 season by means of several small pilot plants established in conjunction with commercial canneries in Georgia. The results of these experiments have not as yet been obtained.

Any attempt to sponsor the dehydration of peaches in the Southeast should be made only after several factors in the situation have been recognized. For example, the drying of peaches has been carried on for years in the Pacific Coast States on a commercial basis. This area has the equipment and experience to augment dried peach production considerably if needed, particularly since efforts have been made to divert peaches from the canning trade. Such emphasis as has been placed on dehydration by the Federal Government has been for vegetables rather than fruits. This is partly explained by the fact that dehydration of fruits

¹²Woodroof, J. G., *Foods Suitable for Freezing Preservation*, Georgia Experiment Station, Bul. 212, 34 pp. 1941.

has been carried on for centuries whereas the production of an acceptable dehydrated vegetable is relatively new and requires more skill. Another factor to be considered is that at least for the time being the Government's demand for dehydrated products is being filled by existing contracts and that new facilities are being discouraged.

AGRICULTURAL COOPERATION IN SOUTHEAST

Opportunities for processing and marketing peaches on a cooperative basis in the Southeast depend as much upon the general attitude of growers toward cooperation as on the economic factors involved. For this reason it is well to consider briefly the progress of cooperation generally in the Southeast, the reasons for lack of progress, and the present status of the cooperative marketing and processing of peaches.

Extent of Cooperation

Cooperation among the farmers of the Southeastern States has not developed to the same extent as in many other sections of the country. This is indicated by the census figures for the United States, as shown in table 10.

Table 10. Percentage of all Farmers Selling Through or Buying Through Cooperative Associations, or Using Other Cooperative Services, for Selected Areas, 1939

Area	Selling	Buying	Services
	<i>Percent</i>		
Alabama	2.9	2.7	3.8
Florida	7.4	5.5	4.1
Georgia	1.7	1.2	7.0
North Carolina	2.0	2.1	4.2
South Carolina	1.6	.8	2.4
Tennessee	2.9	2.0	5.9
Total	2.6	2.0	4.8
United States	13.6	12.2	11.7

Source: 16th Census of the United States, 1940, U. S. Dept. of Commerce.

The percentage of all farmers selling through cooperative associations in the six Southeastern States is 2.6 percent compared with the average of 13.6 for the United States. North Carolina and South Carolina had lower percentages than any other State in the United States. Similarly, Georgia and South Carolina had lower percentages of farmers buying through cooperative associations than any other State. For the six Southern States combined only 2 percent of the farmers bought supplies through cooperative associations, as compared with an average for the United States of 12.2 percent.

A recent study of the cooperative movement¹³ shows that the South Atlantic geographical division from Delaware to Florida had the highest rate of discontinuance of cooperative activity over the 20 year period, 1920-39. The rate was 9 percent as compared with the United States average of 4.9 percent. This same report indicates that the number of farmers' marketing and purchasing associations in this division steadily declined from 648 in 1929 to 499 in 1939.

Reasons for Lack of Progress

Farm tenure, farm income, and the level of education are generally regarded as responsible in part for the lack of a more rapid cooperative development in the Southeast. Approximately 50 percent of the farm operators in the six States are tenants. Farm tenancy ranges from a low of 25 percent in Florida to a high of 60 percent in Georgia. For the six States combined 45 percent of the tenants are sharecroppers, a majority of whom are colored. Approximately one-third of the sharecroppers move each year. Many forms of agricultural cooperative activity require stability in the community and a rather substantial investment in physical property. Under such circumstances it is not difficult to understand why cooperative activity has not progressed at a more rapid rate.

The history of agricultural cooperation in the Southeastern States apparently has been such as to make many producers somewhat skeptical. This is reflected in the general attitude of responsible individuals who claim that the growers prefer cash for their produce from cash buyers to the possibilities of obtaining a higher return from their cooperative if such a return depends upon a delayed payment. The comment is also frequently heard that the growers cannot be counted on to live up to a contract if it is to their advantage to break it. The claim is made that producers are unwilling to invest in a cooperative and cannot be counted on to stick through the trying period of getting an organization running smoothly. Such comments stress the need for carefully developed plans for any cooperative undertaking and the necessity of placing before the growers concerned a full and complete picture of what is to be done, how it is to be done, and the probable results to be expected.

Peach Cooperatives

Peach growers as a group are considered to be among the better class of farmers because of the investment required to produce peaches on a commercial basis and the long-time nature of this type of undertaking.

There are seven cooperative associations marketing and canning peaches in the Southeast - four in Georgia and three in South Carolina. Of the seven associations, three market peaches in the fresh state only, two sell fresh fruit and do some canning, and two are set up for the primary purpose of canning.

¹³ Elsworth, R. G., and Wanstall, G., *Farmers' Marketing and Purchasing Cooperatives. 1863-1939*, F.C.A. Misc. Report No. 40, 36 pp. 1941.

APPENDIX

Table 11. Peaches: Production and price received by farmers,
United States, 1919-40

Year	California			Southern States ¹	Other States	Total United States	Seasonal average price per bushel received by producers
	Clingstone	Freestone	Total				
	1,000 bu.						Cents
1919	5,584	11,501	17,085	20,219	14,506	51,810	189
1920	5,750	9,376	15,126	11,582	17,893	44,601	204
1921	4,667	8,251	12,918	13,023	6,872	32,813	148
1922	8,084	9,126	17,210	17,423	22,772	57,405	133
1923	7,084	8,751	15,835	11,354	17,601	44,790	137
1924	5,625	8,001	13,626	22,112	16,016	51,754	124
1925	9,524	6,667	16,251	18,530	10,736	45,517	137
1926	13,626	8,626	22,252	20,673	22,384	66,309	99
1927	13,416	6,626	20,044	11,585	11,558	43,187	117
1928	17,251	8,501	25,752	22,680	17,630	66,062	97
1929	7,501	5,875	13,376	13,505	17,856	44,737	137
1930	22,585	10,584	33,169	12,885	9,292	55,346	89
1931	16,543	7,584	24,127	24,893	28,033	77,053	57
1932	14,168	8,626	22,794	5,854	14,646	42,294	53
1933	14,626	7,459	22,085	13,455	9,731	45,271	76
1934	13,501	7,126	20,627	19,040	8,018	47,685	81
1935	12,001	5,875	17,876	17,022	19,792	54,690	85
1936	14,043	7,292	21,335	14,565	11,583	47,483	95
1937	15,418	7,834	23,252	14,176	22,296	59,724	102
1938	13,042	7,459	20,501	16,680	14,764	51,945	77
1939	15,501	8,792	24,293	16,594	20,185	61,072	82
1940	14,709	8,876	23,585	14,120	16,725	54,430	80

¹Includes North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

Source: U. S. Dept. of Agriculture, Bureau of Agricultural Economics.

Table 12. Peaches: Production and price to growers in leading regions 1924-41

Year	Production and price in -							
	N.C., S.C., Ga., Tenn., Ala., Ark., Texas		Pa., N.J., Del., Md., Va., W. Va.		Ill., Ind., Mo.		N.Y., Mich., Ohio	
	Prod. 1,000 bu.	Cents per bu.	Prod. 1,000 bu.	Cents per bu.	Prod. 1,000 bu.	Cents per bu.	Prod. 1,000 bu.	Cents per bu.
1924	19,370	114	7,141	163	1,571	184	3,111	201
1925	16,577	146	3,123	181	1,584	212	3,011	202
1926	19,611	91	8,005	91	4,531	132	5,034	104
1927	10,451	145	4,164	163	1,471	209	2,631	197
1928	21,138	103	5,312	144	2,593	148	4,619	151
1929	11,536	121	5,828	129	4,813	139	2,554	183
1930	11,859	123	3,144	167	72	177	3,162	135
1931	22,795	60	8,744	62	7,095	55	6,618	60
1932	5,238	95	4,594	78	460	116	4,888	69
1933	12,306	85	4,152	114	1,816	121	1,901	127
1934	16,801	83	1,265	164	1,511	118	947	180
1935	14,838	88	4,678	118	5,303	92	5,345	92
1936	13,048	118	3,614	145	373	153	3,116	147
1937	12,324	129	7,297	102	4,247	112	5,754	104
1938	14,797	97	5,015	128	1,740	122	2,956	138
1939	14,503	114	6,084	103	3,318	100	5,694	76
1940	12,758	108	6,767	90	766	125	3,505	105
¹ 1941	21,715	68	7,095	101	4,234	88	5,611	93

Year	Production and price in -							
	Colo., Utah, Idaho, Wash., Oreg.		California					
			Clingstone		Freestone		Total	
	Prod. 1,000 bu.	Cents per bu.	Prod. 1,000 bu.	Cents per bu.	Prod. 1,000 bu.	Cents per bu.	Prod. 1,000 bu.	Cents per bu.
1924	2,412	173	5,625	105	8,001	56	13,626	76
1925	1,598	187	9,584	83	6,667	91	16,251	86
1926	3,795	99	13,626	91	8,626	94	22,252	92
1927	2,352	140	13,418	54	6,626	71	20,044	60
1928	3,478	107	17,251	50	8,501	59	25,752	53
1929	3,198	134	7,501	162	5,875	122	13,376	144
1930	2,128	136	22,585	48	10,584	63	33,169	54
1931	3,133	61	16,543	39	7,554	52	24,127	44
1932	3,784	40	14,168	22	8,626	27	22,794	25
1933	1,152	127	14,626	44	7,459	54	22,085	48
1934	3,434	89	13,501	64	7,126	60	20,627	62
1935	3,214	90	12,001	65	5,875	64	17,876	64
1936	3,890	79	14,043	65	7,292	65	21,335	65
1937	2,795	97	15,418	95	7,834	61	23,252	84
1938	4,143	73	13,042	23	7,459	46	20,501	32
1939	3,876	78	15,501	8,792	24,293	40
1940	4,666	77	14,709	49	8,876	56	23,585	52
¹ 1941	4,187	103	13,626	114	8,626	94	22,252	106

¹ Data for 1941 preliminary.

Table 13. Exports of peaches from United States, 1935 to 1941

Season ¹	Canned Peaches etc.	Fresh Peaches etc.	Dried Peaches etc.	Total
1935-36	102,956,930	10,041,205	6,097,386	119,095,521
1936-37	50,243,878	16,070,657	7,044,851	73,359,386
1937-38	56,837,142	8,153,790	6,348,795	70,889,727
1938-39	96,651,064	10,436,303	8,237,690	115,325,057
1939-40	86,409,913	8,778,959	5,158,684	100,347,556
1940-41	3,963,134	7,822,599	1,603,817	13,389,550
TOTAL	396,612,061	61,903,513	34,491,223	492,406,797

¹Beginning July 1.

Source: U. S. Dept. of Commerce, Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States.

Table 14. United States canned peach pack, 1936 to 1940

Item	Canned peach pack ¹				
	1936	1937	1938	1939	1940
	Cases	Cases	Cases	Cases	Cases
Freestone varieties:					
California.....	475,091	1,042,953	376,423	882,463	1,133,737
Other States.....	257,262	284,446	355,390	554,618	730,197
Total.....	732,353	1,327,399	731,813	1,437,081	1,863,934
Clingstone varieties	10,236,033	12,204,694	9,646,685	10,730,712	9,653,126
Grand total.....	10,968,386	13,532,093	10,378,498	12,217,793	11,522,060

¹In actual cases with the exception of California, which are standard cases of 24/2½'s.

Source: Western Canner and Packer Yearbook and Statistical Number, April 25, 1941.

Table 15. United States canned peach pack by size of container, 1937 to 1941

Size	Canned peach pack				
	1937	1938	1939	1940	1941
	Cases	Cases	Cases	Cases	Cases
No. 2½.....	8,345,168	6,471,457	8,117,862	7,842,160	9,305,033
82 Short and Tall....	483,802	313,632	441,800	255,946	289,065
No. 1 Tall.....	1,428,392	1,022,689	1,456,600	1,114,336	1,222,951
No. 2.....	460,950	307,066	204,896	249,707	474,248
No. 10.....	2,964,361	2,109,895	1,833,982	1,909,917	3,266,652
Miscellaneous.....	196,861	170,609	60,953	91,817	220,261
Total.....	13,879,354	10,400,358	12,116,173	11,463,683	14,778,415

Source: Canned Food Pack Statistics, 1941, Part 2 - Fruits, Division of Statistics, National Cannery Association, Washington, D. C., June 1942.

REGULATIONS UNDER THE FEDERAL FOOD, DRUG AND COSMETIC ACT
RELATING TO IDENTITY, LABEL STATEMENT OF OPTIONAL INGREDIENTS,
QUALITY, AND LABEL STATEMENT OF SUBSTANDARD QUALITY FOR CANNED PEACHES

Canned peaches, identity: label statement of optional ingredients

(a) Canned peaches is the food prepared from one of the optional peach ingredients specified in paragraph (b) and one of the optional packing media specified in paragraph (c). Such food may be seasoned with one or more of the following optional ingredients:

- (1) spice;
- (2) flavoring, other than artificial flavoring;
- (3) a vinegar;
- (4) peach pits, except in the cases of peeled whole peaches and unpeeled whole peaches in a quantity not more than 1 peach pit to each 8 ounces of finished canned peaches; and
- (5) peach kernels, except in the cases of peeled whole peaches and unpeeled whole peaches, and except when optional ingredient (4) is used.

Such food is sealed in a container and is so processed by heat as to prevent spoilage.

(b) The optional peach ingredients referred to in paragraph (a) are prepared from mature peaches of the yellow clingstone, yellow freestone, white clingstone, or white freestone varietal group, and are in the following forms of units: peeled whole, unpeeled whole, peeled halves, peeled quarter, peeled slices, peeled dice, peeled mixed pieces of irregular sizes and shapes. Each such form of units prepared from each such varietal group is an optional peach ingredient. Each such ingredient, except in the case of peeled whole peaches and unpeeled whole peaches, is pitted. For the purpose of paragraph (e), the names of such optional peach ingredients are the words "Yellow Cling" or "Yellow Clingstone," "White Cling," or "White Clingstone," "Yellow Free" or "Yellow Freestone," or "White Free" or "White Freestone" as the case may be, preceded or followed by the word or words "Whole," "Unpeeled Whole," "Halves," or "Halved," "Unpeeled Halves" or "Unpeeled Halved," "Quarters" or "Quartered," "Slices" or "Sliced," "Dice" or "Diced," or "Mixed Pieces of irregular Sizes and Shapes" as the case may be.

(c) The optional packing media referred to in paragraph (a) are:

- | | |
|------------------------------|-------------------------------------|
| (1) water | (6) extra heavy syrup |
| (2) peach juice | (7) slightly sweetened peach juice, |
| (3) slightly sweetened water | (8) light peach juice sirup, |
| (4) light syrup | (9) heavy peach juice sirup, and |
| (5) heavy syrup | (10) extra heavy peach juice sirup |

As used in this paragraph the term "water" means, in addition to water, any mixture of water and peach juice; and the term "peach juice" means

the fresh or canned expressed juice of mature peaches, of any varietal group specified in paragraph (b), to which no water is added, directly or indirectly.

Each of packing media (3) to (10), inclusive, is prepared with a liquid ingredient and a saccharine ingredient. Water is the liquid ingredient from which packing media (3) to (6), inclusive, are prepared, and peach juice is the liquid ingredient from which packing media (7) to (10), inclusive, are prepared. The saccharine ingredient from which packing media (3) to (10), inclusive, are prepared is one of the following: sugar; or any combination of sugar and dextrose in which the weight of the solids of the dextrose used is not more than one-half the weight of the solids of the sugar used; or any combination of sugar and corn sirup in which the weight of the solids of the corn sirup used is not more than one-third the weight of the solids of the sugar used; or any combination of sugar, dextrose, and corn sirup in which twice the weight of the solids of the dextrose used added to three times the weight of the solids of the corn sirup used is not more than the weight of the solids of the sugar used; except that packing media (7) to (10), inclusive, are not prepared with any invert sugar sirup or with any corn sirup other than dried corn sirup. A packing medium prepared with peach juice and any invert sugar sirup or corn sirup other than dried corn sirup, is considered to be prepared with water as the liquid ingredient.

The densities of packing media (3) to (10) inclusive, as measured on the Brix hydrometer fifteen days or more after the peaches are canned, fall within the range prescribed after each in the following list:

Number of Packing Medium:	Brix measurement:
(3) and (7)	Less than 14 ⁰
(4) and (8)	14 ⁰ or more but less than 19 ⁰
(5) and (9)	19 ⁰ or more but less than 24 ⁰
(6) and (10)	24 ⁰ or more but not more than 35 ⁰

(d) For the purposes of this section--

- (1) The term "sugar" means refined sucrose or invert sugar sirup. The term "Invert sugar sirup" means an aqueous solution of inverted or partly inverted refined or partly refined sucrose, the solids of which contain not more than 0.3 percent by weight of ash, and which is colorless, odorless, and flavorless except for sweetness.
- (2) The term "dextrose" means the hydrated or anhydrous, refined monosaccharide obtained from hydrolized starch.
- (3) The term "corn sirup" means an aqueous solution obtained by the incomplete hydrolysis of cornstarch, and includes dried corn

sirup; the solids of corn sirup and of dried corn sirup contain not less than 56 percent by weight of reducing sugars calculated as dextrose.

(e) The label shall bear the name of the optional peach ingredient used, as specified in paragraph (b), and the name whereby the optional packing medium used is designated in paragraph (c), preceded by "In" or "Packed in." When any of the optional ingredients permitted by one of the following specified subparagraphs of paragraph (a) is used, the label shall bear the words set forth below after the number of such subparagraph:

- (1) "Spiced" or "Spice added" or "With Added Spice," or in lieu of the word "Spice," the common name of the spice;
- (2) "Flavoring Added" or "With Added Flavoring," or, in lieu of the word "Flavoring," the common name of the flavoring;
- (3) "Seasoned with Vinegar" or "Seasoned with ----- Vinegar," the blank being filled in with the word showing the kind of vinegar used;
- (4) "Seasoned with Peach Pits";
- (5) "Seasoned with Peach Kernels."

When two or more of the optional ingredients specified in paragraph (a) (1), (2), (3), and (4) or (5) are used, such words may be combined as for example, "Seasoned with Cider Vinegar, Cloves, Cinnamon Oil, and Peach Kernels."

- (4) Wherever the name "peaches" appears on the label so conspicuously as to be easily seen under the customary conditions of purchase, the words herein specified, showing the optional ingredients used, shall immediately and conspicuously precede or follow such name without intervening written, printed, or graphic matter, except that the specific varietal name of the peaches may so intervene.

Canned Peaches - Quality; label statement of substandard quality.

(a) The standard of quality for canned peaches is as follows:

- (1) All units tested in accordance with the method prescribed in subsection (b) are pierced by a weight of not more than 300 grams;
- (2) In the cases of halves and quarters, the weight of each unit is not less than 3/5 ounce and 3/10 ounce, respectively;

- (3) In the cases of whole peaches, halves and quarters, the weight of the largest unit in the container is not more than twice the weight of the smallest unit therein;
- (4) Except in the case of unpeeled peaches, there is present in the finished canned peaches not more than 1 square inch of peel per each 1 pound of net contents;
- (5) Not more than 20 percent of the units in the container are blemished with scab, hail injury, discoloration, or other abnormalities;
- (6) In the cases of whole peaches, halves, quarters, and slices, all units are untrimmed, or are so trimmed as to preserve normal shape; and
- (7) Except in the case of mixed pieces of irregular sizes and shapes, not more than 5 percent of the units in a container of 20 or more units, and not more than one unit in a container of less than 20 units, is crushed or broken. (A unit which has lost its normal shape because of ripeness and which bears no mark of crushing shall not be considered to be crushed or broken.)

(b) Canned peaches shall be tested by the following method to determine whether or not they meet the requirements of clause (1) of subsection (a):

So trim a test piece from the unit as to fit, with peel surface up, into a supporting receptacle. If the unit is of different firmness in different parts of its peel surface, trim the piece from the firmest part. If the piece is unpeeled, remove the peel. The top of the receptacle is circular in shape, of 1-1/8 inches inside diameter, with vertical sides; or rectangular in shape, 3/4 inch by 1 inch inside measurements, with ends vertical and sides sloping downward and joining at the center at a vertical depth of 3/4 inch. Use the circular receptacle for testing units of such size that a test piece can be trimmed therefrom to fit it. Use the rectangular receptacle for testing other units. Test no unit from which a test piece with rectangular peel surface at least 1/2 inch by 1 inch cannot be trimmed. Test the piece by means of a round metal rod 5/32 inch in diameter. To the upper end of the rod is affixed a device to which weight can be added. The rod is held vertically by a support through which it can freely move upward or downward. The lower end of the rod is a plane surface to which the vertical axis of the rod is perpendicular. Adjust the combined weight of the rod and device to 100 grams. Set the receptacle so that the surface of the test piece is held horizontally. Lower the end of the rod to the approximate center of such surface, and add weight to the device at a uniform, continuous rate of 12 grams per second until the rod pierces the test piece. Weigh the rod and weighted device. Test all units in containers of 50 units or less, except those units too small for testing or too soft for trimming. Test at least 50 units, taken at random, in containers of more

than 50 units; but if less than 50 units are of sufficient size and firmness for testing, test those which are of sufficient size and firmness.

(c) If the quality of canned peaches falls below the standard prescribed in subsection (a) of this section, the label shall bear the general statement of substandard quality specified in section 10,020 (a), in the manner and form therein specified; but in lieu of such general statement of substandard quality, the label may bear the alternative statement "Below Standard in Quality -----," the blank to be filled in with the words specified after the corresponding number of each clause of subsection (a) of this section which such canned peaches fail to meet, as follows: (1) "Not Tender"; (2) "Small Halves," or "Small Quarters," as the case may be; (3) "Mixed Sizes"; (4) "Not Well Peeled"; (5) "Blemished"; (6) "Unevenly Trimmed"; (7) "Partly Crushed or Broken." Such alternative statement shall immediately and conspicuously precede or follow, without intervening written, printed, or graphic matter, the name "Peaches" and any words and statements required or authorized to appear with such name, by section 27,000 (b).

